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Studies in *Sisyrinchium*.—VII: The Species of British America

BY EUGENE P. BICKNELL

The examination of our larger collections of blue-eyed grasses has disclosed few specimens from north of the United States other than those contributed by Prof. John Macoun. For this reason it was a matter of the greatest interest to receive recently from Professor Macoun his entire British American collection or, more exactly, some thirty-three sheets representing the general result of many years of field-work covering the wide range of British American territory from Newfoundland to Vancouver. This collection, supplemented by such other material as has been brought together, presents so much that is new, especially in regard to the range of our species, that it has seemed well to make it the subject of a separate paper.

It should be said that the genus *Sisyrinchium* is here taken in a somewhat restricted sense to embrace only the homogeneous and very natural group of the blue-eyed grasses proper, thus excluding *Sisyrinchium grandiflorum* Douglas, which is clearly the type of a distinct genus, as recognized by Rafinesque, and should stand as *Olsynium Douglasii* (A. Dietr.), and omitting further the more closely allied yellow-flowered genus *Hydastylus* Salisbury, typified by *Sisyrinchium Californicum* Aiton.

As thus limited it appears that eight species of *Sisyrinchium* may be ascribed to British America and there is no doubt that this number may be increased. Certain more or less distinct forms of several of the species might, even now, be recognized but are passed over. It is further altogether probable that several northwardly ranging species of the United States cross over into Canadian territory and there is also evidence that new species yet remain to be discriminated.

The species which may be recognized at the present time as British American are the following, noting them from east to west :

<i>S. graminoides</i> Bicknell.	<i>S. septentrionale</i> Bicknell.
<i>S. angustifolium</i> Miller.	<i>S. Idahoense</i> Bicknell.
<i>S. albidum</i> Raf.	<i>S. littorale</i> Greene.
<i>S. mucronatum</i> Michx.	<i>S. Macouni</i> sp. nov.

Of these all but *S. littorale* and *S. Macouni* belong also to the United States, though *S. septentrionale* is all but exclusively British American.

Other species known to occur in states adjoining Canadian territory are the following :

S. Atlanticum Bicknell, Maine (North Berwick, York Co., June 21, 1891, J. C. Parlin, in Herb. Gray, not previously recorded from the state) ; New Hampshire ; Vermont.

S. arenicola Bicknell, Nantucket ; New York.

S. hastile Bicknell, Michigan.

S. Farwellii Bicknell, Michigan.

S. strictum Bicknell, Michigan.

S. apiculatum Bicknell, Michigan.

S. campestre Bicknell, Minnesota ; North Dakota.

S. occidentale Bicknell, North Dakota ; Montana ; Idaho.

S. segetum Bicknell, Washington.

S. sarmentosum Suksdorf, Washington.

SISYRINCHIUM GRAMINOIDES Bicknell

This species is of interest as being the only normally branched species occurring north of the United States. Since it there extends northward to central and western New York and throughout the southern peninsula of Michigan its occurrence in the southwestern extremity of Ontario was to be expected, and it is only surprising that a single specimen alone attests its presence there. Elsewhere in Canada the plant was scarcely to be looked for and it is a matter of no little surprise to find it as far north and east as the coast of Gaspé in Quebec and on Newfoundland and Sable Island. These occurrences afford a most unexpected extension of range as the species appears to be unknown elsewhere in Canada east of Ontario nor in New England beyond eastern Massachusetts.

The specimens from Ontario and Gaspé are perfectly typical, while those from Newfoundland and Sable Island show departures from the ordinary plant so considerable as to give them some rank as insular forms. Indeed the Newfoundland plant would scarcely be taken at all for *S. graminoides* and has been distributed as *S. angustifolium* Miller (Robinson's & Schrenck's Flora

of Newfoundland, No. 129) to which species I had myself doubtfully referred it (Bull. Torr. Club, 26 : 339).

A number of sheets of the distribution show the plant to be mostly only 6–10 cm. high, and simple-stemmed with somewhat prolonged outer bract, thus closely simulating *S. angustifolium*. It is, however, clearly a much reduced northern or insular form of *S. graminoides*, drying dark as in that species, and showing the weak and narrow proper stem and relatively broad thin rings with closely serrulate edges, and also its thin-walled sub-globose capsules or spreading pedicels. The leaves are also those of that species, unmistakably so in a few stouter examples where they become 4 mm. wide, although mostly not exceeding 1–1.5 mm.

The tendency of this little plant to develop more clearly the characters of *S. graminoides* is shown by two examples collected with the others which are three to four times taller and forked into two slender branches. These specimens show the extreme form of attenuation seen in the mainland plant and are nearly matched by the specimens from Sable Island, where Professor Macoun reports the plant as common. It is there uniformly very slender, the stems and leaves being but 1–2 mm. wide, and appears to have unusually small capsules, unlike the Newfoundland plant on pedicels scarcely spreading or exerted. It differs further from the latter in larger size (15–30 cm. high) rather broader spathes with less prolonged outer bract and in slenderly branched stem, only a few examples having the stem simple.

In Gaspé and Newfoundland, at the extreme northeastern limit of its habitat, this, the widest-ranging of all our species except *S. angustifolium*, flowers from late in July till the end of August, three to four months later than in the Gulf States, two to three months later than in the South Atlantic States, except at high altitudes, and one to two months later than in the latitude of New Jersey. In northern Michigan the species is equally late flowering. In Ontario it appears to flower about the same time as in central New York, and two or three weeks later than in southern Michigan and New Jersey.

The following specimens may be cited :

SABLE ISLAND : July 22, 1899, in flower ; Aug. 4, 1899, immature fruit. John Macoun.

NEWFOUNDLAND : Banks of the Salmonier River, Aug. 26, 1899, B. L. Robinson and H. Schrenck, no. 129, Flora of Newfoundland, nearly mature fruit and some remaining flowers.

QUEBEC : Coast of Gaspé, Aug. 12, 1882, moist meadows, John Macoun ; in flower and with young fruit.

ONTARIO : Near Niagara Falls, June 25, 1892, in grassy woods, John Macoun ; flowers and young fruit.

SISYRINCHIUM ANGUSTIFOLIUM Miller

This is the most characteristic and generally distributed species of British America, ranging from Newfoundland quite across into British Columbia and north to the Mackenzie River. No eastern specimens have come to hand from farther north than Newfoundland and Rivière du Loup, Quebec. I have elsewhere pointed out that specimens from west of Ontario differ in some rather striking particulars from the more eastern plant, being stiffer and more glaucous with the edges of leaves and stem often quite smooth and with leaves of thicker texture and closer venation and with the primary bract usually more slenderly prolonged. Eastern specimens often show a discoloration on the herbarium sheet in marked contrast with most western examples. It is quite possible that these differences point to two distinct species which a full series of specimens with well-preserved flowers and mature fruit would make it possible to segregate. The western plant itself exhibits a great amount of variation, and certain specimens from Banff, Alberta, appear almost distinct. They are very glaucous and extremely slender and tall, becoming 50 cm. high with the narrow outer bract two to three times the length of the inner one, even becoming 6 cm. long ; the slender pedicels become 28 mm. long, and are more than usually exserted ; the flowers appear to be rather small and of very delicate texture with an unusual extension of the yellow center along the midvein of the segments.

The species crosses the Rocky mountains into British Columbia, extending further west than I have yet had it from the United States where Madison County, Montana (Rydberg), limits its western record as far as known.

In Newfoundland and Nova Scotia the species comes into flower from late in June till the middle of July, a month to six

weeks later than in the neighborhood of New York, and earlier than *S. graminoides* by about the same length of time. In Ontario it comes into flower during the first half of June, while farther west, from Manitoba to British Columbia, the flowering period seems to be rather earlier, often beginning in the first days of June, or even before. The only example seen from as far north as the Mackenzie River was just in flower July 20th.

The following collections may be cited, all made by Professor Macoun unless not otherwise noted.

NEWFOUNDLAND : June 25, 1896, just in flower ; July 12 and 15, 1897, in full flower, Rev. A. C. Waghorne.

NOVA SCOTIA : Louisburg, Cape Breton, July 17, 1883, moist meadows, just in full flower. Amherst Island, low grounds, July 30, 1880, just in flower, Richardson.

PRINCE EDWARD'S ISLAND : Brackley Point, meadows, July 3, 1887, full flower and young fruit ; July 7, 1888, just in flower.

NEW BRUNSWICK : Campbellton, July, 1877, boggy meadows, R. Chalmers ; St. John's River Valley, Woodstock, July 4, 1899, flowers and young fruit. Baie Vert, June 16, 1893, first flowers; Prof. W. L. Goodwin.

QUEBEC : Riviere du Loup, August 26, 1889, meadows, mature fruit, D. N. St. Cyr ; Danville, June, 1894, first flowers, N. K. Berg ; Montreal, F. W. Kelly.

ONTARIO : Belleville, June 16, 1876, moist meadows, first flowers ; Jones Falls, June 11, 1895, fruit full size, J. Fowler ; Nepigon River, July 7, 1884, moist meadows, fruit nearly mature ; Toronto Island, June 10, 1893, full flower, C. W. Armstrong ; Casselman, June 6, 1891, full flower, dampish ground, Jas. M. Macoun, Lambton, C. K. Dodge.

MANITOBA : Lake Winnipeg Valley, 1857, Bourgeau ; Stonewall, June 2, 1896, full flower, amongst rocks, open prairie.

ASSINIBOIA : Moose Mountain Creek, June 6, 1883, first flowers, low ground, Jas. M. Macoun ; Park Beg, June 23, 1896, fruit nearly mature, open prairie ; Crane Lake, June 16, 1894, full flower, meadows.

SASKATCHEWAN : E. Bourgeau, 1858.

ALBERTA : Banff, July 14, 1891, flowers and young fruit.

BRITISH COLUMBIA : Kitamen River, Kootanie Valley, July

1883, fruit and last flowers, Dawson ; Donald, Columbia Valley, July 7, 1885, fruit nearly mature ; Lower Arrow Lake, June 4, 1890, first flowers. Latitude 54° , June 15, 1875, first flowers ; "The exact locality is on the Machaco River, near Fort St. James, B. C." [J. M.].

MACKENZIE RIVER : Fort Wrigley, July 20, 1892, first flowers, Miss E. Taylor ; the most northern point from which any species of the genus has been reported. Prof. Macoun writes : "Fort Wrigley is a new location, about half way between Fort Simpson and Fort Norman, on the right bank of the Mackenzie River, about latitude 63° ."

SISYRINCHIUM ALBIDUM Raf.

This species must be admitted to the Canadian flora on the evidence of a single collection made at Sandwich, Ontario, by William Boott as far back as May 26, 1887. The specimens (Gray Herbarium) are in full bloom, thus showing the plant to be the earliest flowering of the British American species. The flowers are pale blue, as in most Michigan examples. Since the species is rather common in parts of southern Michigan, it is not surprising to find that it crosses the Detroit River into Ontario.

I have seen but a single specimen of this species from farther east—Stanley county, North Carolina (W. W. Ashe). Very possibly it may extend farther north and east in Ontario.

SISYRINCHIUM MUCRONATUM Michx.

Like *S. albidum* this species crosses the Detroit River into Ontario, having been collected at Sarnia, Lambton county, by Mr. C. K. Dodge in June, 1897. Specimens from farther north in the Province, Wingham, Huron county, have been distributed by Mr. J. A. Morton, collected in full flower June 5, 1895. Most specimens of this collection are much reduced and have very small pale green spathes and but little exerted pedicels only 10–15 mm. long. Mr. Dodge's specimens from Lambton county, have the spathes deep purple and are closely matched by examples from east Pennsylvania.

A material and most unexpected extension of the known range of the plant is afforded through a collection made at Prince Albert, Saskatchewan, by Professor Macoun, June 29, 1896. The speci-

mens are in full flower and appear to differ in no material way from many Pennsylvania examples, having, however, rather long-bracted green spathes and with some of the pedicels more exserted than is usual and longer, 20–27 mm. in length.

The most northern and western point from which the species has been known hitherto is Port Huron, Michigan (C. K. Dodge).

Certain imperfect specimens of a *Sisyrinchium* from northern Minnesota, which I have elsewhere referred to under *S. angustifolium*, if not a distinct species may represent a stoutly developed form of *S. mucronatum*.

SISYRINCHIUM SEPTENTRIONALE Bicknell

Professor Macoun's collection affords a most interesting confirmation of the validity of this species previously described from only scant material. I am now able to record seven separate collections of the plant, giving it a range from western Manitoba north to Saskatchewan and west to British Columbia and Washington :

MANITOBA : west of Fort Ellice, June 29, 1879, flowers and young fruit, wet prairies, Macoun ; east of Pipestone Creek, June 26, 1880, flowers and mature fruit, Macoun.

ASSINIBOIA : Moose Mountain Creek, June 16, 1883, full flower, low ground, Macoun.

SASKATCHEWAN : E. Bourgeau, 1858, Palliser's Brit. N. Am. Exploring Expedition.

ALBERTA : Banff, July 8, 1891, flowers and fruit, village street, Macoun.

BRITISH COLUMBIA : Kicking Horse River, Aug. 13, 1890, mature fruit, low gravelly banks, 4000 ft. alt., Jas. M. Macoun.

WASHINGTON : Wilkes' expedition, 1838–42, Spokane to Colville.

The specimens from Idaho elsewhere doubtfully referred here prove to be not this species.

Professor Macoun writes, " This is certainly a good species and seems to prefer drier situations than any of the others. To be more correct it seems to prefer arid spots where water has lain and dried up. Besides the specimens collected I saw it very frequently between Wood Mountain and the Rocky Mountains over

400 miles from east to west. Its white flowers make it easily seen although it is seldom tall."

The following particulars may now supplement the original description of this plant (Bull. Torr. Club, 26 : 452-3):

Plant becoming 35 cm. high, sometimes merely glaucescent : tufts often very close and narrow : primary bract sometimes 6 cm. long and surpassing the inner one 35 mm. : flowers frequently pure white : perianth 4-8 mm. long, column 3-4 mm. high : capsules obovoid-oblong to subglobose, usually thin-walled and corrugate : seeds very small, about .75 mm. in diameter, obovoid and irregularly angled, black, finely rugulose, becoming smooth or nearly so.

SISYRINCHIUM IDAHOENSE Bicknell

BRITISH COLUMBIA : Agassiz, May 8 and 14, 1889, full flower, meadows, Macoun ; Lower Frazier River, 49° N. lat., Dr. Lyall, 1859 ; Vancouver Island, Victoria, June 10, 1893, full flower, Macoun ; Nootka Sound, July, 1896, full flower, Jos. R. Anderson.

"This is the common species west of the Coast Range in British Columbia and on Vancouver Island" [J. M.].

The specimens from Agassiz and the Lower Frazier River are nearest to the Idaho type, but are more slender throughout, and with the leaves and stems smooth-edged or nearly so. The specimens from Nootka Sound are small and still more slender, appearing quite unlike the type, but they are imperfect and can be referred at present only to a reduced northern form. The specimens from Victoria are broader-leaved and more discolored besides having the stem distinctly serrulate. They are closely matched by certain specimens from western Washington and Oregon which are doubtless not the same as *S. Idahoense*, but while these latter differ notably from typical *S. Idahoense* in much stouter roots, the roots of the Vancouver plant are equally slender with those of the other British American specimens.

S. Idahoense is almost certainly an aggregate, but the component forms cannot be understood from present material.

It is worthy of note that the Agassiz plant appears to be earlier-flowering than the plant in Idaho, and also blooms decidedly earlier than does *S. angustifolium* anywhere in British America.

SISYRINCHIUM LITTORALE Greene

VANCOUVER ISLAND : Oak Bay, near Victoria, May 31, 1893, first flowers, Macoun.

The counterpart in appearance of many examples of the Alaskan plant, but apparently somewhat more glaucescent and with the stamineal column longer—7–9 mm. high as against a nearly uniform length of 6 mm. in such Alaskan specimens as have been examined. This difference is a suggestive one and its constancy should be especially noted when the plant is again collected.

“I cannot remember seeing this species anywhere else than at Oak Bay” [J. M.].

The Vancouver plant flowers about one month earlier than the species in Alaska.

***Sisyrinchium Macounii* sp. nov.**

Becoming 50 cm. tall, the narrow grass-like tufts loosely disintegrate-fibrillose at base, the roots slender and nearly simple : pale dull green and glaucescent, somewhat discolored when dry. Leaves long and narrow, mostly 20–30 cm. long, 1.5–3 mm. wide, slenderly very acute, rather thin, the delicate nerves firm and distinct but not crowded, the edges smooth : stem single but sometimes bearing near the top a slender leaf subtending a simple peduncle, very slender, 1–1.5 mm. wide, with very narrow almost membranous margins, the edges smooth or obscurely denticulate-roughened towards the top, transversely constricted just below the spathe : spathes green or slightly purplish along the edges, often or usually abruptly deflected, long and narrow, the bracts thin and not prominently nerved ; outer bract slenderly much elongated and tapering acute, 4–7 cm. long, surpassing the inner bract 1.5–4 cm., the extreme edge hyaline below, united-clasping for 4–7 mm. at base ; inner bract 23–33 mm. long, tapering and slenderly acute, distinctly hyaline-margined, the keel often sparsely denticulate ; interior scales silvery-white, tapering, short, about half the length of the inner bract : flowers large, few, apparently only 2–4, on slenderly exserted subspreading pedicels becoming 35 mm. long, perianth 18–22 mm. long, the emarginate segments very slenderly aristulate, deep purple with a very small yellow eye, the base abruptly broadened from its attachment on the ovary ; stamineal-column 8–9 mm. high, anthers 2 mm. long.

“This species was not rare around Comox and was occasion-

ally seen at Nanaimo and on the islands in the Gulf of Georgia" [J. M.].

VANCOUVER ISLAND: Comox, June 21, 1893, meadows, John Macoun.

Named in honor of Professor Macoun.

A handsome species, having the largest and most richly-colored flowers of any simple-stemmed species known to me. It is perhaps most nearly related to *S. segetum*, of Washington, but is much taller and larger, though relatively more slender, and differs notably from this, as well as from the stouter and paler-flowered *S. Idahoense*, in the greatly prolonged outer bract. Two specimens from Vancouver which appear to be reduced forms of this species are smaller flowered than the type with shorter bracts, the outer one much less elongated, and are suggestive of *S. segetum* or slender forms of *S. Idahoense*, although the type is clearly distinct from either. Professor Macoun writes further: "You are quite right in thinking this plant a striking species. Indeed so large were its flowers that I thought it was *S. grandiflorum* when I saw it first."